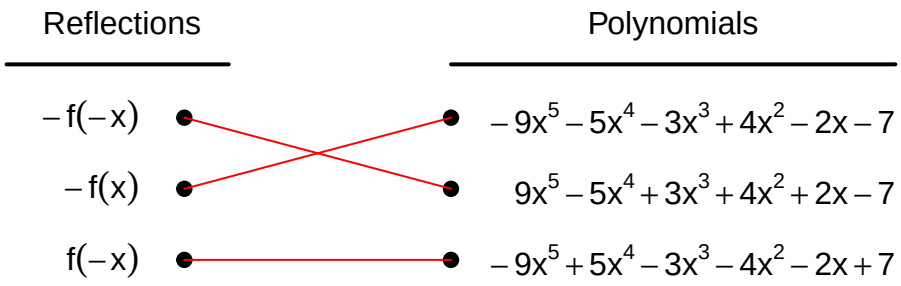
Name: Date:

Exam: Function Reflections (Solution version 609)

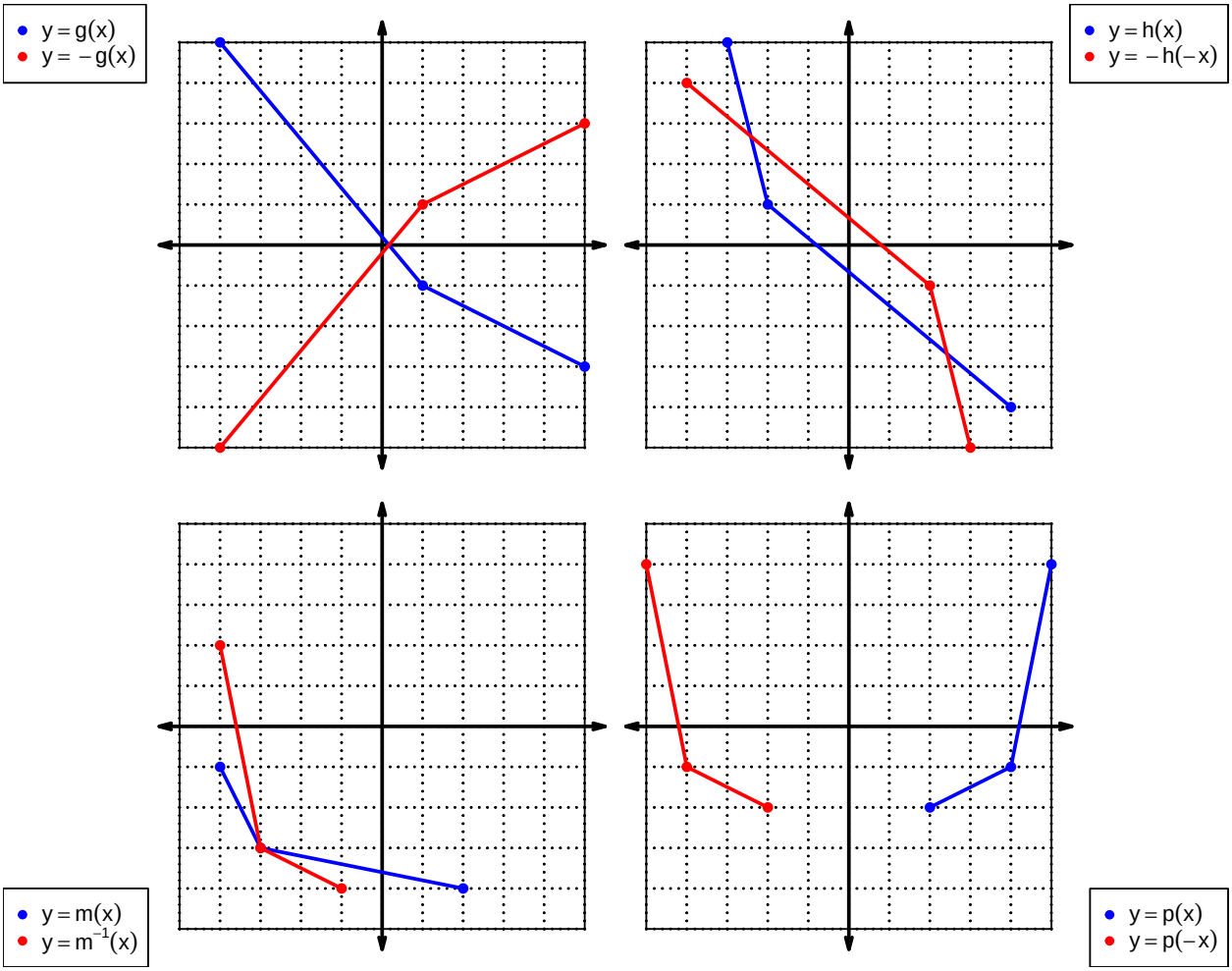
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = 9x^5 + 5x^4 + 3x^3 - 4x^2 + 2x + 7$$

Draw lines that match each function reflection with its polynomial:



2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	5	8	3
2	1	3	8
3	4	9	5
4	7	6	9
5	6	1	2
6	3	4	7
7	8	2	4
8	9	5	6
9	2	7	1

3. (worth 3 points) Evaluate $h(5)$.

$$h(5) = 2$$

4. (worth 3 points) Evaluate $f^{-1}(7)$.

$$f^{-1}(7) = 4$$

5. (worth 3 points) Assuming f is an **even** function, evaluate $f(-1)$.

If function f is even, then

$$f(-1) = 5$$

6. (worth 3 points) Assuming g is an **odd** function, evaluate $g(-6)$.

If function g is odd, then

$$g(-6) = -4$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) \;=\; -x^3 - x$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; -(-x)^3 - (-x)$$
$$p(-x) \;=\; x^3 + x$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(x^3 + x\right)$$
$$-p(-x) \;=\; -x^3 - x$$

c. Is polynomial p even, odd, or neither?

odd

d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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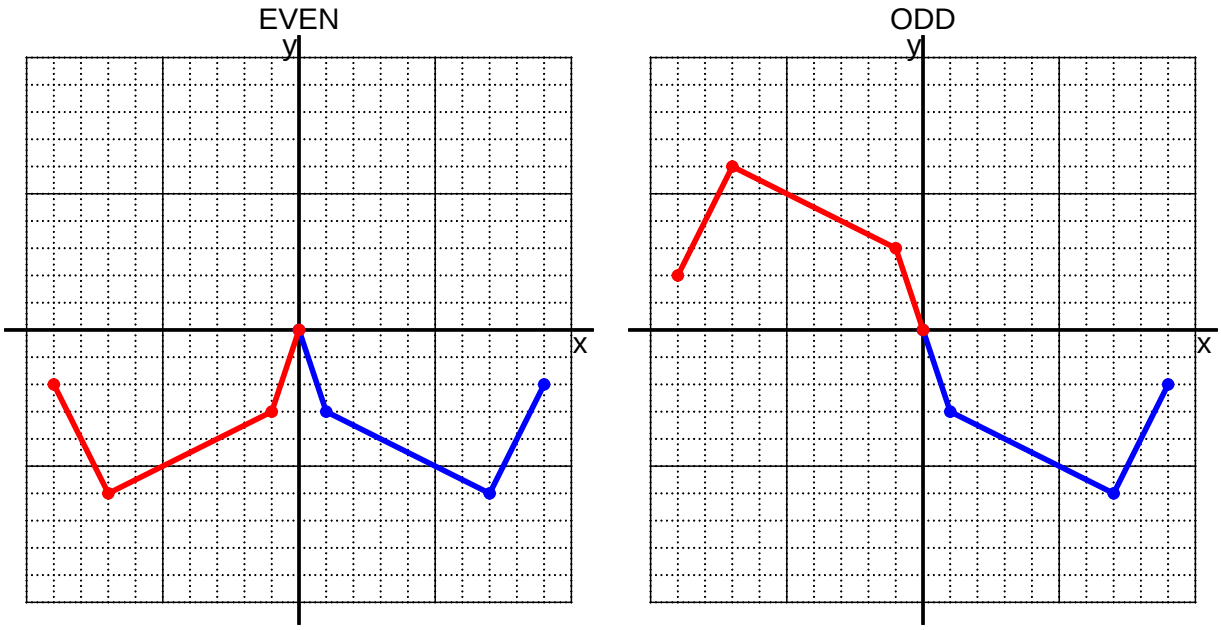
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = 7x - 6$$

a. Evaluate $f(10)$.

step 1: multiply by 7
step 2: subtract 6

$$f(10) = 7(10) - 6$$
$$f(10) = 64$$

b. Evaluate $f^{-1}(57)$.

step 1: add 6
step 2: divide by 7

$$f^{-1}(x) = \frac{x+6}{7}$$
$$f^{-1}(57) = \frac{(57)+6}{7}$$
$$f^{-1}(57) = 9$$

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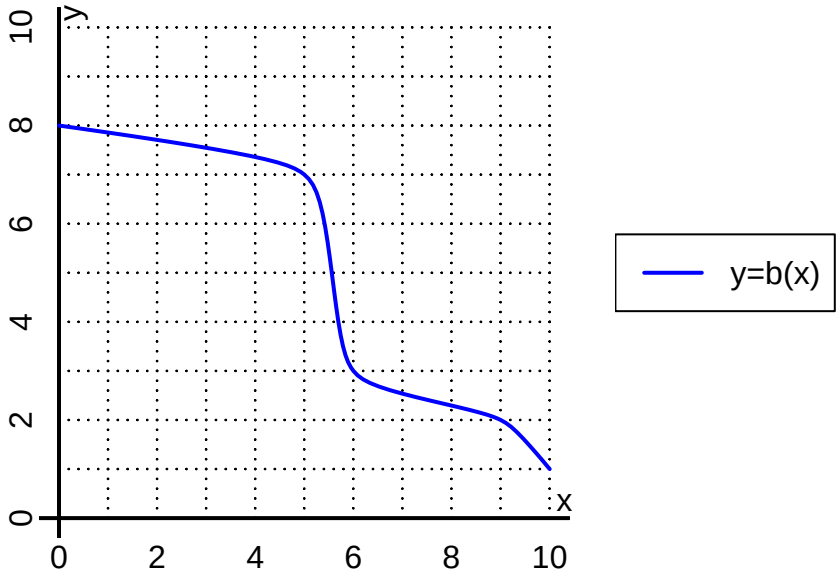
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(9)$.

$b(9) = 2$

b. Evaluate $b^{-1}(7)$.

$b^{-1}(7) = 5$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	6	-6	6	-6
-1	-3	3	-3	3
0	0	0	0	0
1	-3	3	-3	3
2	6	-6	6	-6

b. Is function f even, odd, or neither?

even

c. How do you know the answer to part b?

Function f is even because column $f(-x)$ matches column $f(x)$ exactly.